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Applicant : MITSUHIRO AIDA
Appn. Title : HANDWRITING TEXT INPUT SYSTEM
Examiner/GAU : STEPHEN HONG / 2176

Mailed on: January 25, 2001
At : NARA CITY, JAPAN

Commissioner of Patents and Trademarks
Washington, District of Columbia 20231

Sir:

Concerning the Office communication mailed on 10/19/2000, an amended description and claims with a view to overcoming the Examiner's objections are attached. The description has been revised and retyped to bring it into line with the claims and for clarity.

Applicant makes the following comments.

The U.S. Patent No. 5109352 (O'Dell) has features to input a stroke code from a keyboard, and has a common way to accept a leading part of stroke codes from the keyboard, compare the entered stroke codes with the contents in a table or in a dictionary, display matched characters on the display, and an operator gets it.

It is stated in the specification that the appratus comprises controller means for comparing the code numbers entered by the operator as they are entered to the strings in the first storing means and for causing the display means to display the shape of a character from the second storing means when the code numbers entered by the entering means uniquely identify said character, so that some characters are uniquely identifiable before entry of all the strokes of such characters, as shown in Figure 5.

However, there is incompleteness, as some Japanese kanji characters do not have a chance to appear on the display according to the method in the patent 5109352, unless the operator forces to continue the input after having some characters on the display, as mentioned below. It is one of the reasons why a traditional way of Japanese kanji character input method in the attached Appendix I, page 5/18 and why the way claimed in this applicant's patent application, should be in use.

U. S. Patent # 5109352, Figure 5;
CHARACTERS AND THEIR DATA STRINGS

距	–	12313131.3233
踊	–	12313132.412331
践	–	12313133.33444
路	–	123131342.4123
跡	–	123131343.4744
跳	–	123131344.4844 (OR 123131348.44-ALTERNATE DATA
踏	–	12313137.2441233 STRING
国	–	12313334.3
虫	–	1231340. (0=END OF CHARACTER KEY) THE ZERO

IS A KEYSTROKE, BUT IS NOT ACTUALLY
STORED.

According to the method (5109352), as an example, the followings inevitably take place, prior to reaching and getting one of such characters as 距、踊、践、路、跡、etc in Figure 5,

(Examples)

After typing codes upto   丨 乛 一   , 口 appears on the display,
< At this point, operator's action is necessary to continue the input process, prior to reaching characters below >

after typing codes upto | ｱ — | , 中 appears on the
display,
< At this point, operator's action is necessary to
continue the input process, prior to reaching characters
below >

after typing codes upto | ｱ — | ⌐ | , 叫 appears on the
display,
< At this point, operator's action is necessary to
continue the input process, prior to reaching characters
below,

      CHARACTERS AND THEIR DATA STRINGS
        距   —   12313131.3233
        踊   —   12313132.412331
        践   —   12313133.33444
        路   —   123131342.4123
        跡   —   123131343.4744
        跳   —   123131344.4844 (OR 123131348.44-ALTERNATE
                                                       DATA
        踏   —   12313137.2441233   STRING

The above steps take place, even if it was different from
what was anticipated by the operator.
* For example, 口、中、叫 are frequently used Japanese
  characters.
  In this case, | ｱ— of 足   equals to   口
               | ｱ—| of 足   equals to   中
               | ｱ—|⌐of 足   equals to   叫

The Examiner also stated in paragraph 9 of the Office
communication that "Figure 5 (USP#5109352) shows the plurality of
lines of words with the same initial stems."

However 疋 in Figure 5 is not same as a stem. It is one of radicals for Japanese kanji characters, and those radicals do not necessarily form a leading part of the Japanese kanji character, as shown in the Appendex II, pages A-1/3, 2/3, 3/3, and Figure 5 of the patent (5109352) does not show the stem, as you can see, eg. 券 for 刀(radical), 妾 for 女(radical), 惣 for 心(radical), and so on.

The Examiner also stated in paragraph 9 of the Office communication that "O'Dell discloses ,,,; random access storing the plural lines of text and the unique line of text," and "Note that all data are stored in a random access fashion, since RAM is part of the storage in FIG. 4."

However, it does not mean "Storing and retrieving in a random access manner." Usually, data are stored in a table or a dictionary sequentially, and accessible one by one, from the beginning of the data area. This is called "Sequential access." There is another one which is called "Random access or Direct access." In latter cases, data are not sequentially stored. Instead, data are stored in a specific location of data area which is determined to be there, by converting part of data into some specific position information in the area to store data. A problem may occur by converting and assigning same location to the plenty of data to store and retrieve during the above conversion, but those can be managed to reallocate and make an additional links for them, to later access properly.

In the present invention, data are mainly organized in the sequencial manner and accessed by "binary search" method to retrieve data record directly, collating the entered data with those in the middle of data area in the dictionary, dividing data area into 2 and utilizing a first part or a latter part, depending on the result of collation made previously to compare the input data with those in the dictionary.

The conventional method has features to input a character from a keyboard, and has a common way to accept a leading part of word from a keyboard, compare the entered characters with the contents in a table or in a dictionary, display matched words on the

display, and an operator is able to select a desired word among them on the display.

However, it is not possible for the operator to type characters in a blind touch (eyes-free) manner due to the way to select one of them on the display. It is also unlikely that the operator reiterates the steps to enter and select the desired one among words shown on the display, character by character. For example, assuming that the operator is going to input "tremendous", he enters "t" and takes a look at the display if there is the word which may lead to "tremendous", and goes back to the next character input, after recognizing so many words on the display with a leading character of "t." The operator continues to enter next "r" which builds a string of characters "tr", and the method searches in the dictionary to get the words having leading "tr", and many words again appear on the display for the selection, as well. Those steps continue until one of them is selected by the operator, and it is impracticable, except some particular case which may disregard efforts of those repetitive steps.

The method of present invention is to achieve a target to eliminate such deficiency of the conventional input method, for both of the character and stroke data input.

Applicant's method requires no special-purpose dictionary, but utilizes a standard dictionary, or an abbreviation dictionary if it is useful, though the abbreviation dictionary is not imperative in the present invention.

Where there is the abbreviation dictionary, applicant's method does still not require to input all of the characters of abbreviation, because of the applicant's method to find the unique one which include the entered line of text in a variety of data input form, in the dictionary, without depression of any special function key to collate, determine and replace the data input with the unique data from the dictionary, and requires no more input. Then, the operator does not have to remember the abbreviation and also may input part of the abbreviation consisting of the first character followed by

some other variable characters of the abbreviation to have it unique in the dictionary.

A text input system of the present invention according to the claim 64 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary storing a plurality of lines of text and relevant words, determine a unique line of text in the dictionary which includes the entered line of text, and select a unique word among relevant words at the time of character input, without being actuated by the depression of a special function key, and replace the entered line of text with the unique line of text or the unique word in the dictionary. None of the cited references discloses or suggests any means of determining, selecting, and replacing the entered line of text with the unique line of text or the unique word determined by means for determining and selecting, by way of entering the line of text, character by character, without the necessity to depress a special function key to collate, determine, select, and replace.

A text input system of the present invention according to the claim 65 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary, identify plural lines of text with the same stem of word which includes said entered line of text, and determine a unique line of text which has the same last character as the last entered character, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input, and also identify plural lines of text with the same stem of word which includes entered line of text, and determine the unique line of text which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with the entered line of text, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input.

None of the cited references discloses or suggests any means

of identifying plural lines of text with the same stem of word and determining the unique one which has the same last character as the last entered character, or which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text.

A text input system of the present invention according to the claim 66 has a feature to enter a line of text, character by character, collate the entered line of text with a dictionary, identify plural lines of text with the same first part as entered line of text, and determine a unique line of text which has the same last character as the last entered character, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input, and also identify plural lines of text with the same first part which includes entered line of text, and determine the unique line of text which includes the same one as the last entered characters in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of character input. None of the cited references discloses or suggests any means of identifying plural lines of text with the same first part as said entered line of text, and determine the unique line of text which has the same last character as the last entered character, or which includes the same one as the last entered character in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text.

A text input method of the present invention according to the claim 67 has a feature to enter a first character followed by some other following characters of a line of text, character by character, and collate entered line of text with a dictionary, determine a unique line of text in the dictionary which includes the first character and some other following characters of line of text, at

the time of character input, without being actuated by the depression of a special function key. None of the cited references discloses or suggests any step of determining the unique one in the dictionary by way of entering the first character and some other following characters, without necessity to depress the special function key to collate, determine, and replace.

A text input system of the present invention according to the claim 68 has a feature to enter a line of text, character by character, collate entered line of text with a dictionary storing a plurality of lines of text, original words, and a unique position count, and determine a unique line of text which has the same unique position count as the number of last collated character position of line of text in the dictionary, without being actuated by the depression of a special function key, at the time of character input. None of the cited references discloses or suggests any means of determining the unique line of text which has the same unique position count as the number of last collated character position of line of text in the dictionary collated with entered line of text.

A text input system of the present invention according to the claim 69 has a feature to store a plurality of lines of text, in a dictionary.

A text input system of the present invention according to the claim 70 has a feature to enter a line of text of handwriting strokes, stroke by stroke, collate entered line of text with a dictionary storing a plurality of lines of text of handwriting strokes, original words for said line of text of handwriting strokes and a unique position count in a dictionary, determine a unique line of text of handwriting strokes in said dictionary which includes said entered line of text of handwriting strokes and which has said unique position count same as the number of last collated stroke position of said line of text of handwriting strokes in said dictionary collated with said entered line of text of handwriting strokes, at the time of entering the handwriting strokes without a special key depression, and replace entered line of text with the

unique line of text or original word in the dictionary. None of the cited references discloses or suggests any means of determining the unique line of text of handwriting strokes which has the same unique position count as the number of last collated stroke position of said line of text of handwriting strokes in said dictionary, and replacing the entered line of text of handwriting strokes with the unique line of text, by way of entering the line of text of handwriting strokes, stroke by stroke, without necessity to depress the special function key to collate, determine, select, and replace.

A text input system of the present invention according to the claim 71 has a feature to enter a line of text of handwriting strokes, stroke by stroke, collate the entered line of text of handwriting strokes with those in a dictionary, identify plural lines of text with the same first part as the entered line of text, and determine a unique line of text which has the same last stroke as the last entered stroke, among identified plural lines of text, without being actuated by the depression of a special function key, at the time of stroke input, and also identify plural lines of text with the same first part which includes said entered line of text, and determine the unique line of text which includes the same one as the last entered strokes in the remaining part of line of text in the dictionary other than that was successfully collated with entered line of text,, among said identified plural lines of text, without being actuated by the depression of a special function key, at the time of stroke input. None of the cited references discloses or suggests any means of identifying plural lines of text with the same first part as said entered line of text, and determine a unique one which has the same last stroke as the last entered stroke, or which includes the same one as the last entered strokes in the remaining part of line of text of handwriting strokes other than that was successfully collated with the entered line of text.

A text input system of the present invention according to the claim 72 has a feature to enter a first stroke followed by some other following strokes of a line of text, stroke by stroke, collate

the entered line of text with a dictionary, determine a unique line of text in the dictionary which includes the first stroke and some other following strokes of line of text, at the time of stroke input, without being actuated by the depression of a special function key. None of the cited references discloses or suggests any step of determining the unique one in the dictionary and replacing the entered line of text with the unique one determined by the determining step by way of entering the first stroke and some other following handwriting strokes to variably input, without necessity to depress the special function key to collate, determine, replace.

A text input method of the present invention according to the claim 64 or 70, wherein means for determining the unique line of text comprises determining a predetermined number range of lines of text in the dictionary. None of the cited references discloses or suggests any means for determing the predetermined number range of lines of text in the dictionary.

A text input method of the present invention according to the claim 64 or 70, wherein means for storing comprises storing the lines of text in the dictionary which is organized in a random access manner. None of the cited references discloses or suggests any means for storing lines of text in a dictionary which is organized in a random access manner.

Examples to show the difference between the present invention and the conventional method are shown in the following tables 1 - 5.

- Table 1 - < Present invention >

(An example of dictionary)

Word pattern element codes of handwriting strokes	Original word	The number of position to be unique in the dictionary

```
----------------------------------------------------------------
    |
    |
02 01 12 11 02              正              2

02 11 25 12 12 00 30       更              2
    |
    |
00 30 12                   A              1

01 34                      B              1

12 01 11 11                E              1
    |
    |
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* In this example, "正" or "更" can be unique
   at the second pattern element code position.

- Table 2 - < Present invention >

Standard dictionary			Selective dictioary
Word (or line of text)	The number of character posi- tion in a word to be unique in the dictionary	The total number of char. of the word	The number of character posi- tion in a word to be unique in the dictionary
abandon	4	7	abandon 3
abate	4	5	

abbot	4	5		
abdomen	3	7	abdomen	3
abhor	3	5		
abide	4	5		
ability	4	7	ability	3
abject	3	6		
able	4	4		
abnormal	3	8	abnormal	3
aboard	4	6		
abolish	6	7	abolish	4
abolition	6	9		
abominable	4	10		
abound	5	6		
about	5	5	about	4
above	4	5		
abridge	4	7	abridge	3
abroad	4	6		
abrupt	4	6		
absence	6	7	absence	4
absent	6	6		
absinthe	4	8		
absolute	6	8	absolute	5
absolve	6	7		
absorb	5	6		
absorbent	7	9	absorbent	5
abstain	5	7	abstain	4

|
|

(Total) 127   184   41   79

(127 / 184 = 0.69 : 31%   (41 / 79 = 0.52 : 48%
       differences   differences
                                     (79 is the number
                                     of total char.)

- Table 3 - < Present invention >

Input	(Determining) step	(Selecting) step	(Replacing) step	Display

<Applicant's method, using the dictionary containing
          eg.
          ..., bonus, booby, book, booked, booking,
          ..., compulsory, compute, computer,
          computerization, computerize, computerizing,
          comrade,...etc. >

Input	(Determining) step	(Selecting) step	(Replacing) step	Display
b				
bo				
boo				
book	X(Active)			
bookg		X(active)	X(Active)	booking
c				
co				
com				
comp				
compu				
compute	X(active)			
computeg		X(Active)	X(Active)	computerizing
computen		X(Active)	X(Active)	computerization
computee		X(Active)	X(Active)	computerize

* X(active) means "Activation of Determining, Selecting, and
   Replacing."

- Table 4 - < Conventional Method >

Input	Searching	Display
time+(Terminator)		All strings having the same key are displayed
time for+T(Terminator)		All strings having the same key are displayed
time for all+T(Terminator)		All strings having the same key (including) "time for all good men to to come to the aid of their country"

- Table 5 -

< Conventional Method >		< Present invention >	
Input	Display	Input /	Display
p	promise, promoter,...	p	

```
                 property, proportion,
                 propose, protest,
                 protest, proud,
                 prove, provide,
                 public, pull...etc
          (All matched words
           appear on the display)


ps        --err--                    ps


prmi      --err--                    prmi        promise
                              (Because of its
                               function to
                               determine a unique
                               one which includes
                               a first char. and
                               some other foll.
                               char.)


prmt      --err--                    prmt        promoter


prtt      --err--                    prtt        protest


prv       --err--                    prv


prvd      --err--                    prvd        provide


pr        promise, promotor,...  pr
          property, proportion,
          propose, protest,
          protest, proud,
          prove, provide,
          (All matched words
```

appear on the display)

pro	promise, promoter,...	pro
	property, proportion,	
	propose, protest,	
	protest, proud,	
	prove, provide,	
	(All matched words	
	appear on the display)	

prom	promise, promoter,...	prom
	(All matched words	
	appear on the display)	

promi	promise	promi	promise
	(Incidentally	(Naturally, a unique
	appears, because	one appears on the
	the system does	display, as its
	support the specifc	normal system
	function to determine	function)
	a unique one)	

| pu | public, pull | pu | |

| pub | public | pub | public |

| pb | --err-- | pb | public |